Norm's Utility Contractor, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
Asphalt Storage Tank Heater Potential to Emit Calculations

Assumptions

Natural Gas Heat Input Rating (MM Btu/hr)	2.115	
Natural Gas Heat Value (Btu/scf)[a]	1050	
Theoretical Max Natural Gas Usage (scf/hr)	2,014	13.536
Potential Hours on Natural Gas[b] (hr/yr)	6,720	

Criteria Pollutant Calculations[c]

Pollutant	EF (lb/10^6 scf)	PTE	
		lb/hr	t/yr
PM	7.6	0.02	0.05
SO_2	0.6	0.0012	0.0041
NOx	100	0.20	0.68
CO	84	0.17	0.57
VOC	5.5	0.01	0.04
Lead	0.0005	1.01E-06	3.38E-06

Idaho Toxic Air Pollutants

Organics[d]

Pollutant	CAS No.	EF (lb/10^6 scf)	PTE (lb/hr)	PTE (t/yr)	Level 1 IDAPA 58.01.01.585/586 (lb/hr)	Comparison
3-Methylchloranthrene	56-49-5	1.80E-06	3.63E-09	1.22E-08	2.50E-06	Below
Benzene	71-43-2	2.10E-03	4.23E-06	1.42E-05	8.00E-04	Below
Benzo(a)pyrene	50-32-8	1.20E-06	2.42E-09	8.12E-09	2.00E-06	Below
Formaldehyde	50-00-0	7.50E-02	1.51E-04	5.08E-04	5.10E-04	Below
Hexane	110-54-3	1.80E+00	3.63E-03	1.22E-02	1.20E+01	Below
Naphthalene	91-20-3	6.10E-04	1.23E-06	4.13E-06	3.33E+00	Below
Pentane	109-66-0	2.60E+00	5.24E-03	1.76E-02	1.18E+02	Below
Toluene	108-88-3	3.40E-03	6.85E-06	2.30E-05	2.50E+01	Below
Benzo(a)anthracene		1.80E-06	3.63E-09	1.22E-08		
Benzo(a)pyrene		1.20E-06	2.42E-09	8.12E-09		
Benzo(b)fluoranthene		1.80E-06	3.63E-09	1.22E-08		
Benzo(k)fluoranthene		1.80E-06	3.63E-09	1.22E-08		
Chrysene		1.80E-06	3.63E-09	1.22E-08		
Dibenzo(a,h)anthracene		1.20E-06	2.42E-09	8.12E-09		
Indeno(1,2,3-cd)pyrene		1.80E-06	3.63E-09	1.22E-08		
Total IDAPA PAH			2.30E-06	7.72E-06	9.10E-05	Below

Metals[e]

Pollutant	CAS No.	Natural Gas EF (lb/10^6 scf)	BOIL1 (lb/hr)	BOIL2 (lb/hr)	Level 1 IDAPA 58.01.01.585/586 (lb/hr)	Comparison
Arsenic	7440-38-2	2.00E-04	4.03E-07	6.72E-04	1.50E-05	Below
Barium	7440-39-3	4.40E-03	8.86E-06	1.48E-02	3.30E-02	Below
Beryllium	7440-41-7	1.20E-05	2.42E-08	4.03E-05	2.80E-05	Below
Cadmium	7440-43-9	1.10E-03	2.22E-06	3.70E-03	3.70E-06	Below
Chromium	7440-47-3	1.40E-03	2.82E-06	4.70E-03	3.30E-02	Below
Cobalt	7440-48-4	8.40E-05	1.69E-07	2.82E-04	3.30E-03	Below
Copper	7440-50-8	8.50E-04	1.71E-06	2.86E-03	1.30E-02	Below
Manganese	7439-96-5	3.80E-04	7.65E-07	1.28E-03	6.70E-02	Below
Mercury	7439-97-6	2.60E-04	5.24E-07	8.74E-04	1.00E-03	Below
Molybdenum	7439-98-7	1.10E-03	2.22E-06	3.70E-03	3.33E-01	Below
Nickel	7440-02-0	2.10E-03	4.23E-06	7.06E-03	2.75E-05	Below
Selenium	7782-49-2	2.40E-05	4.83E-08	8.06E-05	1.30E-02	Below
Vanadium	1314-62-1	2.30E-03	4.63E-06	7.73E-03	3.00E-03	Below
Zinc	7440-66-6	2.90E-02	5.84E-05	9.74E-02	3.33E-01	Below

Notes:

[a] *Fuel heat values from EPA AP-42, Appendix A (December 2005)*

[b] *Potential hours of operation 52 weeks at 18 hours and 7days.*

[c] *Criteria Pollutants EPA AP-42, Section 1.4, Tables 1.4-1 and 1.4-2 & Section 1.3, Tables 1.3-1, 1.3-2 and 1.3-3 (December 2005)*

[d] *Organic/Toxic Air Pollutants EPA AP-42, Section 1.4, Table 1.4-3 & Section 1.3, Table 1.3-9 (December 2005)*

[e] *Metals from EPA AP-42, Section 1.4, Table 1.4-4 & Section 1.3, Table 1.3-10 (December 2005)*

Norm's Utility Contractor, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
Load-out, Silo and Asphalt Tank Potential to Emit Calculations

Assumptions:

Asphalt volatility, V[a]	-0.5
Mix Temperature[a]	325 °F
% VOC in load out TOC[b]	94 %
% VOC in Silo TOC[b]	100 %
Max hourly throughput	250 tons
Max yearly throughput	300,000 tons

Calculations[a]

Load-out Total PM EF = $0.000181+0.00141(-V)e^{((0.0251)(T+460)-20.43)}$
= 0.0005 lb / t

Silo Total PM EF = $0.000332+0.00105(-V)e^{((0.0251)(T+460)-20.43)}$
= 0.0006 lb / t

Load-out Total CO EF = $0.00558(-V)e^{((0.0251)(T+460)-20.43)}$
= 0.0013 lb / t

Silo Total CO EF = $0.00488(-V)e^{((0.0251)(T+460)-20.43)}$
= 0.0012 lb / t

Load-out Total TOC EF = $0.0172(-V)e^{((0.0251)(T+460)-20.43))}$
= 0.0042 lb / t

Silo Total TOC EF = $0.0504(-V)e^{((0.0251)(T+460)-20.43)}$
= 0.0122 lb / t

Load-out Organic PM EF[c] = $0.00141(-V)e^{((0.0251)(T+460)-20.43))}$
= 0.0003 lb / t

Silo Organic PM EF[c] = $0.00105(-V)e^{((0.0251)(T+460)-20.43)}$
= 0.0003 lb / t

Criteria Pollutants

Load-out and Yard Emissions	PM		CO		VOC	
	lb	ton	lb	ton	lb	ton
Max hourly	0.13	6.52E-05	0.34	1.69E-04	0.98	4.89E-04
Max yearly	156.56	0.08	404.77	0.20	1,172.82	0.59
Silo Filling and Storage	**PM**		**CO**		**VOC**	
	lb	ton	lb	ton	lb	ton
Max hourly	0.15	7.32E-05	0.29	1.47E-04	3.05	1.52E-03
Max yearly	175.77	0.09	353.99	0.18	3,656.01	1.83
Total hourly	**0.28**	**1.38E-04**	**0.63**	**3.16E-04**	**4.02**	**2.01E-03**
Total yearly	**332.35**	**0.17**	**758.77**	**0.38**	**4828.83**	**2.41**

[a] *EPA AP-42, Table 11.1-14, constants and equations, (December 2000)*
[b] *EPA AP-42, Table 11.1-16, (December, 2000)*
[c] *Used for HAP calculations on next page.*

Norm's Utility Contractor, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
Load-out, Silo Filling and Asphalt Tank Potential to Emit Calculations (HAP)

Hazardous Air Pollutants[4]

Pollutant	CAS #	Load-out speciation	Silo and Asphalt tank speciations	Load-out hourly lb	Load-out hourly ton	Load-out yearly lb	Load-out yearly ton	Silo and Tank hourly lb	Silo and Tank hourly ton	Silo and Tank yearly lb	Silo and Tank yearly ton	Total hourly lb	Total hourly ton	Total yearly lb	Total yearly ton	IDAPA 58.01.01 585/586 - EL (lb/hr)	Compare to EL
PAH HAPs																	
Acenaphthene	83-32-9	0.25%	0.47%	2.22E-04	1.11E-07	2.66E-01	1.33E-04	2.99E-04	1.49E-07	3.58E-01	1.79E-04	5.20E-04	2.60E-07	6.24E-01	3.12E-04		
Acenaphthylene	208-96-8	0.03%	0.01%	2.39E-05	1.19E-08	2.86E-02	1.43E-05	5.88E-06	4.44E-09	1.07E-02	5.33E-06	3.28E-05	1.64E-08	3.93E-02	1.97E-05		
Anthracene	120-1207	0.07%	0.13%	5.97E-05	2.98E-08	7.16E-02	3.58E-05	8.25E-06	4.13E-09	9.90E-02	4.95E-05	1.42E-04	7.11E-08	1.71E-01	8.53E-05		
Benz(a)anthracene	56-55-3	0.02%	0.056%	1.62E-05	8.10E-09	1.94E-02	9.72E-06	3.55E-05	1.78E-08	4.27E-02	2.13E-05	5.17E-05	2.58E-08	6.21E-02	3.10E-05		
Benzo(b)fluoranthene	205-99-2	0.0076%	ND	6.48E-08	3.24E-09	7.77E-03	3.89E-06					6.48E-08	3.24E-09	7.77E-03	3.89E-06		
Benzo(k)fluoranthene	207-08-9	0.0022%	ND	1.85E-08	9.26E-10	2.22E-03	1.11E-06					1.85E-08	9.26E-10	2.22E-03	1.11E-06		
Benzo(g,h,i)perylene	191-24-2	0.0019%	ND	1.62E-08	8.10E-10	1.94E-03	9.72E-07					1.62E-08	8.10E-10	1.94E-03	9.72E-07		
Benzo(a)pyrene	50-32-8	0.0023%	ND	1.98E-08	9.90E-10	2.38E-03	1.19E-06					1.98E-08	9.90E-10	2.38E-03	1.19E-06		
Benzo(e)pyrene	192-97-2	0.0078%	0.0085%	6.85E-08	3.42E-09	7.98E-03	3.99E-06	6.03E-06	3.01E-09	7.24E-03	3.62E-06	1.27E-05	6.34E-06	1.52E-02	7.61E-06		
Chrysene	218-01-9	0.103%	0.21%	8.76E-05	4.38E-08	1.05E-01	5.27E-05	1.33E-04	6.66E-08	1.60E-01	8.00E-05	2.21E-04	1.11E-07	2.65E-01	1.33E-04		
Dibenz(a,h)anthracene	53-70-3	0.0004%	ND	3.15E-07	1.58E-10	3.78E-04	1.89E-07					3.15E-07	1.58E-10	3.78E-04	1.89E-07		
Fluoranthene	206-44-0	0.050%	0.15%	4.26E-05	2.13E-08	5.11E-02	2.56E-05	9.52E-05	4.76E-08	1.14E-01	5.71E-05	1.36E-04	6.89E-08	1.65E-01	8.27E-05		
Fluorene	86-73-7	0.77%	1.01%	6.56E-04	3.28E-07	7.88E-01	3.94E-04	6.41E-04	3.21E-07	7.69E-01	3.85E-04	1.30E-03	6.49E-07	1.56E+00	7.79E-04		
Indeno(1,2,3-cd)pyrene	193-39-5	0.00047%	ND	4.01E-07	2.00E-10	4.81E-04	2.40E-07					4.01E-07	2.00E-10	4.81E-04	2.40E-07		
2-Methylnaphthalene	91-57-6	2.36%	5.27%	2.00E-03	1.01E-06	2.40E+00	1.22E-03	3.04E-03	1.67E-06	4.01E+00	2.01E-03	5.37E-03	2.69E-06	6.45E+00	3.22E-03		
Naphthalene	91-20-3	1.25%	1.82%	1.07E-03	5.33E-07	1.28E+00	6.39E-04	1.16E-03	5.78E-07	1.39E+00	6.93E-04	2.22E-03	1.11E-06	2.66E+00	1.33E-03		
Perylene	198-55-0	0.02%	0.03%	1.66E-06	8.28E-09	2.28E-02	1.13E-05	7.90E-05	9.52E-09	2.29E-02	1.14E-05	3.76E-05	1.88E-08	4.54E-02	2.27E-05		
Phenanthrene	85-01-8	0.81%	1.80%	6.90E-04	3.45E-07	8.28E-01	4.14E-04	1.14E-03	5.71E-07	1.37E+00	6.86E-04	1.83E-03	9.16E-07	2.20E+00	1.10E-03		
Pyrene	129-00-0	0.15%	0.44%	1.28E-04	6.39E-08	1.53E-01	7.67E-05	2.79E-04	1.40E-07	3.35E-01	1.68E-04	4.07E-04	2.04E-07	4.89E-01	2.44E-04		
Total for Comparison[5]												2.66E-04	1.45E-07			9.10E-05	Exceeds
Other Semi-Volatile																	
Phenol		1.18%	ND	1.01E-03	5.09E-07	1.21E+00	6.03E-04					1.01E-03	5.03E-07	1.21E+00	6.03E-04		
Volatile Organic																	
Benzene	71-43-2	0.052%	0.032%	5.41E-04	2.70E-07	6.49E-01	3.24E-04	9.75E-04	4.87E-07	1.17E+00	5.85E-04	1.52E-03	7.58E-07	1.82E+00	9.09E-04	8.00E-04	Exceeds
Bromomethane	74-83-9	0.010%	0.0049%	9.98E-05	4.99E-08	1.20E-01	5.99E-05	1.48E-04	7.48E-08	1.78E-01	8.89E-05	2.48E-04	1.25E-07	2.99E-01	1.49E-04	NA	Below
2-Butanone	78-93-3	0.049%	0.038%	5.06E-04	2.55E-07	6.11E-01	3.06E-04	1.19E-03	5.94E-07	1.43E+00	7.13E-04	1.70E-03	8.49E-07	2.04E+00	1.02E-03	3.93E+01	Below
Carbon Disulfide	75-15-0	0.013%	0.0160%	1.35E-04	6.76E-08	1.62E-01	8.11E-05	4.87E-04	2.44E-07	5.85E-01	2.92E-04	6.22E-04	3.11E-07	7.47E-01	3.74E-04	2.00E+00	Below
Chloroethane	75-00-3	0.00021%	0.004%	2.15E-06	1.08E-09	2.58E-03	1.31E-06	1.22E-04	6.09E-08	1.46E-01	7.31E-05	1.24E-04	6.20E-08	1.49E-01	7.44E-05	NA	Below
Chloromethane	74-87-3	0.015%	0.025%	1.58E-04	7.89E-08	1.87E-01	9.38E-05	7.01E-04	3.50E-07	8.41E-01	4.20E-04	8.57E-04	4.28E-07	1.03E+00	5.14E-04	NA	Below
Cumene	92-82-8	0.110%	ND	1.14E-03	5.72E-07	1.37E+00	6.86E-04					1.14E-03	5.72E-07	1.37E+00	6.86E-04	1.63E+01	Below
Ethylbenzene	100-41-4	0.26%	0.04%	2.91E-03	1.46E-06	3.49E+00	1.75E-03	1.18E-03	5.79E-07	1.39E+00	6.95E-04	4.07E-03	2.03E-06	4.88E+00	2.44E-03	2.90E+01	Below
Formaldehyde	50-00-0	0.058%	0.69%	9.15E-04	4.57E-07	1.10E+00	5.49E-04	2.10E-02	1.05E-05	2.52E+01	1.26E-02	2.19E-02	1.10E-05	2.63E+01	1.32E-02	5.10E-04	Exceeds
n-Hexane	100-54-3	0.150%	0.10%	1.56E-03	7.80E-07	1.87E+00	9.35E-04	3.05E-03	1.52E-06	3.66E+00	1.83E-03	4.81E-03	2.30E-06	5.53E+00	2.76E-03	NA	Below
Isooctane	540-84-1	0.0018%	0.00%	1.87E-06	9.36E-09	2.25E-02	1.12E-05	9.44E-06	4.72E-09	1.13E-02	5.67E-06	2.82E-05	1.41E-08	9.38E-02	1.69E-05	NA	Below
Methylene Chloride	75-09-2	0.00%	0.0003%					8.25E-06	4.11E-09	9.87E-03	4.94E-06	8.25E-06	4.11E-09	9.87E-03	4.94E-06	1.80E-03	Below
MTBE	1634044	0.00%	ND													NA	Below
Styrene	100-42-5	0.0073%	0.0054%	7.58E-05	3.80E-08	9.11E-02	4.55E-05	1.65E-04	8.23E-08	1.97E-01	9.87E-05	2.40E-04	1.20E-07	2.89E-01	1.44E-04	6.67E+00	Below
Tetrachloroethene	127-18-4	0.0077%	ND	8.01E-05	4.00E-08	9.61E-02	4.80E-05					8.01E-05	4.00E-08	9.61E-02	4.80E-05	1.30E-02	Below
Toluene	108-88-3	0.21%	0.06%	2.15E-03	1.08E-06	2.58E+00	1.31E-03	1.88E-03	9.44E-07	2.27E+00	1.13E-03	4.07E-03	2.04E-06	4.89E+00	2.44E-03	2.50E+01	Below
1,1,1-Trichloroethane	71-55-6	0.00%	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00									NA	Below
Trichloroethene	79-01-6	0.00%	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00									NA	Below
Trichlorofluoromethane	75-69-4	0.0013%	ND	1.35E-05	6.76E-09	1.62E-02	8.11E-06					1.35E-05	6.76E-09	1.62E-02	8.11E-06	NA	Below
m-/p-Xylene	1330-20-7	0.41%	0.30%	4.26E-03	2.13E-06	5.12E+00	2.56E-03	6.09E-03	3.05E-06	7.31E+00	3.66E-03	1.04E-02	5.18E-06	1.24E+01	6.21E-03	2.90E+01	Below
o-Xylene	95-47-6	0.08%	0.057%	8.32E-04	4.16E-07	9.98E-01	4.99E-04	1.74E-03	8.69E-07	2.09E+00	1.04E-03	2.57E-03	1.28E-06	3.08E+00	1.54E-03	2.90E+01	Below
Total												8.76E-02	3.99E-05	8.10E+01	4.05E-02		

[4] EPA AP-42, Table 11.1-15 (December 2008)
[5] EPA AP-42, Table 11.1-16, (December 2008)
[6] As listed in IDAPA 58.01.01.586

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Norm's Utility Contractor, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
Aggregate Handling and Storage Piles Potential to Emit Calculations

Assumptions:

Mean Wind Speed[a], U	9.74 mph	
Moisture Content, M	2.5 % Coarse aggregate	
	6 % Sand	
Particle Size Multiplier		
(<10μm), k	0.35	
Hours Operation	6720 hrs/yr	
1 ft³ aggregate[b]	126 lbs	
1 Rock storage pile	900,000 ft³ each.	56,700 tons each
(2 rock and 1 sand)	450,000 ft³ each.	28,350 tons each
Rock to Sand Mix	75:25	

Calculations

PM-10 EF[c] = k*(0.0032)*(U/5)1.3/(M/2)1.4
= 0.002 lb / t coarse aggregate
= 0.001 lb / t sand

Emissions based on 250 t/hr production rate:

agg. max rate	187.5 t/hr	sand max rate	62.5 t/hr				
PM-10 =	**0.37 lb/hr**	**=**	**0.04 lb/hr**	**Total**	**0.40**	**lb/hr**
PM-10 =	**1.83E-04 t/hr**	**=**	**1.79E-05 t/hr**		**0.00**	**t/hr**

Emissions based on max year throughput (300,000 tpy) rate and storage capacity:

agg. max rate	225,000 t/yr	sand max rate	75,000 t/yr			
agg. storage	113,400 t	sand storage	28,350 t			
total agg.	338,400 t/yr	total sand	103,350 t/yr			
PM-10 =	**659.84 lb/yr**	**=**	**59.16 lb/yr**	**Total**	**719**	**lb/yr**
PM-10 =	**0.33 t/yr**	**=**	**0.03 t/yr**		**0.36**	**t/yr**

[a] Wind Speed provide by IDEQ, Email August 2005, Spokane Met data 1987-1991
[b] EPA-AP-42, Appendix A, (December 2005)
[c] EPA AP-42, Equation 13.2.4-1 (December 2005)

Norm's Utility Contractor, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
Conveyor Potential to Emit Calculations

PM-10 Emission Factors[a]

Conveyor Transfer Point	0.0011	lb/ton processed
Truck Loading Conveyor	0.0001	lb/ton processed

Assumptions

Transfer Points: 6 on main system

Max hourly throughput	250	tons/hr
Max yearly throughput	300,000	tons/yr

Calculations

Emissions based max hourly throughput rate:

Transfer	1.65	lb/hr	8.25E-04 t/hr
Loading	0.03	lb/hr	0.0000125 t/hr
Total PM-10	**1.68**	**lb/hr**	**8.38E-04 t/hr**

Emissions based on max year throughput rate:

Transfer	1980.00	lb/yr	0.99 t/yr
Loading	30.00	lb/yr	0.02 t/yr
Total PM-10	**2010.00**	**lb/yr**	**1.01 t/yr**

[a] *EPA AP-42, Table 11.19.2-2, (December 2005)*

Norm's Utility Contractor, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
Paved Road Traffic Potential to Emit Calculations

Assumptions:

Emission Factors for 1980's Vehicle Fleet, C (PM-10)[a]	0.00047	lb/vehicle mile traveled (vmt)	
Particle Size Multiplier, k (PM-10)[b]	0.016	lb/vmt	
Silt Loading (sL)[c]	120.0	g/m2	
Average weight of vehicles traveling road,W	12.8	tons	(20%, 40 ton dump trucks and 80%, 6 ton trucks)
Amount of paved road at facility	0.11	miles	
Max hourly throughput	250	ton/hr	
Max yearly throughput	300,000	ton/yr	
Number of round trips per hour	12		
Number of round trips per year	15000		

Calculations

$$PM\text{-}10\ EF^{d} = k(sL/2)^{0.65} \times (W/3)^{1.5} - C$$

$$= 2.018 \text{ lb / vmt}$$

PM-10	0.222	lb
	1.1E-04	tons
PM-10 max hourly	**2.7**	**lb/hr**
	1.33E-03	**t/hr**
PM-10 yearly	**3,330**	**lb/yr**
	1.7	**t/yr**

[a] *EPA AP-42, Table 13.2.1-1, (December 2005)*
[b] *EPA AP-42, Table 13.2.1-2, (December 2005)*
[c] *EPA AP--42, Table 13.2.1-4, (December 2005)*
[d] *EPA AP-42, Equation 13.2.1-1, (December 2005)*

Norm's Utility Contractor, Inc.
Portable Hot-Mix Asphalt Plant Permit Application
Unpaved Road Traffic Potential to Emit Calculations

Assumptions:

Particle Size Multiplier, k (PM-10)[a]	1.5	lb/vmt	
Silt Content[b]	4.8	%	
a (PM-10)[a]	0.9		
b (PM-10)[a]	0.45		
Average weight of vehicles traveling road, W	23	tons	(50%, 40 ton dump trucks and 50%, 6 ton trucks)
Amount of unpaved road at facility	0.15	miles	
Max hourly throughput	250	ton/hr	
Max yearly throughput	300,000	ton/yr	
Number of round trips per hour	12		
Number of round trips per year	15000		

Calculations

$$PM\text{-}10\ EF^{c} = k(s/12)^{a} \times (W/3)^{b}$$
$$= 1.644 \text{ lb / vmt}$$

PM-10	0.247	lb
	1.2E-04	tons
PM-10 max hourly	**3.0**	**lb/hr**
	1.48E-03	**t/hr**
PM-10 yearly	**3,700**	**lb/yr**
	1.8	**t/yr**

[a] *EPA AP-42, Table 13.2.2-2, (Air CHIEF, April 2004)*
[b] *EPA AP--42, Table 13.2.2-1, (Air CHIEF, April 2004)*
[c] *EPA AP-42, Equation 13.2.2-1a, (Air CHIEF, April 2004)*